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DETERMINATION OF LENGTH-WEIGHT RELATIONSHIP IN *SEPIA PHARAONIS* AND TEST FOR SEX SPECIFIC VARIATION

Muhammad Khaliluddin
Marine Fisheries Department, Govt. of Pakistan,
Karachi, Pakistan.

ABSTRACT: The parameters a and b of the length-weight relationship of *Sepia pharaonis* of the form of $W=a.L^b$ was determined. Sex separated size frequency data collected from Karachi fish Harbour was analysed the length-weight equations, separable by male, female and sex combined. The apparent difference in paired values of exponents b1, b2 for any combination i.e. male versus female and male, female versus sex combined was tested for their significant difference. No significant difference was observed for any combination, this indicated no sex specific variation in length-weight relationship of *Sepia pharaonis*.

KEY WORDS: Length-wegith relationship, *Sepia pharaonis*, sex specific variation.

INTRODUCTION

Length-weight relationship is important for biological study such as stock assessment and assessment of population parameters. In the recent past fishery biologists have been taking keen interest in studying the length-weight relationship of either a particular fish species or members of fish family or all fish species inhabiting a water body Kolding *et al.* (1992) studied the length-weight relationship in 22 fish species of Lake Kariba. Francisco (1992) estimated length-weight relationship of 40 species of Lake Kariba in Africa. Yanagawa (1994) studied length-weight relationship of 26 species belonging to 17 fish families from Gulf of Thailand. Shower (1993) studied the length-weight relationship of five species of family Sparidae of gulf of Guinea. Entsua *et al.* (1995) estimated parameter of length-weight equation of 45 fish species sampled in the tributaries of Volta River. Hameed (1994) studied length-weight relationship of *Nemipterus bipunctatus* off Tulicorin in the Gulf of Mannar, India. Edwards and Shaher (1991) studied length-weight relationship of 23 species of fish and the fish population of Gulf of Aden. The scope of the study is further widened with the development and use of the statistical models for testing the reliability of the estimated parameters of the L/W relationship. Usually the study of L/W relationship in the fishes is undertaken by analysing the sex separated size frequency to derive separate value of exponent 'b' for males and females on the assumption that growth parameters are sex specific. But in the study of L/W relationship the exponent 'b' of male and females are comparable with the third exponent generated by analysing the sex combined size frequency. The difference in pair values of exponent (b1, b2) for any combination i.e. male versus female, male and female versus sex combined is then statistically tested for any significant difference for determining whether the sex specific variation in L/W relationship exist or not.

MATERIAL AND METHODS

Size ferquency data collected in *Sepia pharaonis* was rearranged with 1cm length class, divided into males females and sex combined for determining the length weight relationship of the order of $W=a.L^b$. Length and weight paired data analysed by using the regression technique after the double logrithmic transformed version of the equation.

$$\text{Log } W = \text{Log } a + b \text{ Log } L$$

The constant parameters a and b estimated for males, females and sex combined (Tab.1, Apendix.1). The significance difference of exponents 'b' for any combination i.e. male versus female, male and female versus sex combined, were investigated by 't' test using the t-statistic as under.

$$t = \frac{|b1 - b2|}{\sqrt{\frac{S^2y1(n1-2) + S^2y2(n2-2)}{n1-n2-4}} \left[\frac{1}{\Sigma(\bar{x}1-\bar{x}1)^2} + \frac{1}{\Sigma(x2-\bar{x}2)^2}\right]}$$

Before performing the significant test for observed difference in pairs exponents (b1, b2) it was predetermined whether the difference of variances of "Y-estimate" were significant or not significant, by applying the statistics as given below. The "Y-estimate" are the predicted values of Log. W coputed for males, females and sex combined.

$$S^2y1/S^2y2 > F\ (n1-2, n2-2; 0.01)$$

Where S^2y1 and S^2y2 are the variances of "Y-estimate" n1-2, n2-2, respective degree of freedom. F the criticl values of distribution table at $p = 0.01$.

RESULTS AND DISCUSSION

The significant test for difference in the variances of "Y-estimates" were non significant. It was further proceeded to test whether the observed difference of exponents (b1, b2) were significant, was investigated by calculating the 't' distribution, the calculated values of 't' for any combination of (b1,b2) pertinant to male, females and sex combined were non significant at P=0.05 (Tab.2) It was thus concluded that a single set of coefficient a and b derived by analysing the sex combined size frequency is sufficient to represent the L/W relationship in male and female of *Sepia pharaonis*.

Table 1. Summary of length-weight relationship in *Sepia pharaonis*.

Sex	Number	Size-Range	a	b	r2
Male	132	(13.5 - 32.5)	0.193	2.748	0.9908
Female	122	(12.5 - 27.5)	0.187	2.773	0.9666
Combined	254	(12.5 - 32.5)	0.216	2.715	0.9824

Table 2. Significance test of pair exponents (b1, b2) for each combination in *Sepia pharaonis*.

Sex Combination	Pair Exponents (b_1-b_2)	Estimated value of (t)	df (n1-n2-4)	Tab. value of t at P=0.05	Significant test
Male vs Female	2.748 2.773	1.014	8	1.86	non-significant
Male vs Combined sex	2.748 2.715	1.048	9	1.83	" "
Female vs Combined sex	2.773 2.715	1.033	5	1.81	" "

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